Diffusion Models already have a Semantic Latent Space

Year: 2022 | Citations: 318 | Authors: Mingi Kwon, Jaeseok Jeong, Youngjung Uh

---

Abstract

Diffusion models achieve outstanding generative performance in various domains. Despite their great success, they lack semantic latent space which is essential for controlling the generative process. To address the problem, we propose asymmetric reverse process (Asyrp) which discovers the semantic latent space in frozen pretrained diffusion models. Our semantic latent space, named h-space, has nice properties for accommodating semantic image manipulation: homogeneity, linearity, robustness, and consistency across timesteps. In addition, we introduce a principled design of the generative process for versatile editing and quality boost ing by quantifiable measures: editing strength of an interval and quality deficiency at a timestep. Our method is applicable to various architectures (DDPM++, iD- DPM, and ADM) and datasets (CelebA-HQ, AFHQ-dog, LSUN-church, LSUN-bedroom, and METFACES). Project page: https://kwonminki.github.io/Asyrp/